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Computer Speech Recognition: A New Tool for Sign Language Interpreters and Members of the Deaf/Hard of Hearing Community

By: Jack Johnson and Carl Jensema

Speech recognition, also known as voice-to-text, is a relatively new technology that allows a person to speak into a microphone and have his/her speech converted to written text by a computer. This text then appears on the computer's monitor for easy viewing. The technology is improving to the point where the process is reasonably fast and accurate.

So how can this technology benefit the deaf or hard of hearing communities? The Institute for Disabilities Research and Training (IDRT) is currently researching this issue. IDRT is involved in a three-year federally funded research project to investigate and develop new applications for speech recognition as an assistive device for members of the deaf or hard-of-hearing community.

What is Speech Recognition?

As previously stated, speech recognition uses a high speed computer to convert spoken language into written text. A person dictates into a microphone, which is connected to an audio card in the computer, and the computer converts the speech into text. The computer speech recognition program "learns" a person's voice patterns, and the more the person uses speech recognition, the more accurately the computer will convert the person's voice to text. Prior to using the system, each person who speaks into the speech recognition program will be required to train on it and create a personal voice file.

This takes one to two hours depending on which speech recognition program you use. The current trend is toward systems that require little or no training.

There are several speech recognition programs currently on the market. The top three speech recognition developers are Dragon Systems, IBM and Kurzweil. All three recently announced low priced (under \$100.00) versions of their software which include a microphone and a vocabulary of up to 22,000 words. More expensive versions of these programs are available and offer vocabularies up to 160,000 words.

Speech Recognition as an Assistive Device

Speech recognition can act as an assistive device for deaf or hard-of-hearing people. Present day American Sign Language (ASL) has approximately 5,000 signs, whereas the English language has over 500,000 words. A sign language interpreter trying to convey complex information must rely on a limited number of signs and finger spell words which have no sign. Interpreting complex technical information in sign language can be very difficult for an interpreter and equally difficult for a person trying to read finger spelling. One way to avoid this is through the use of speech recognition.

Using speech recognition, an interpreter has access to a vocabulary in excess of 160,000 words. The drawback is that the speech

recognition currently cannot keep up with normal speaking speeds. Most speech recognition systems have a practical speed of about 60 words a minute while people usually speak at 120 to 140 words a minute. Sign language is fast, but the number of signs available is limited. Speech recognition is slow, but has a very large vocabulary.

Dr. Carl Jensema, a deaf man who is Vice President of IDRT, is researching speech recognition applications for deaf or hard-of-hearing people. He started considering the benefits of speech recognition for the deaf or hard-of-hearing population about four years ago and his experience indicates that speech recognition is an assistive tool with great potential for classroom sign language interpreters in a mainstream setting.

Use of speech recognition may help a student gain better access to a class lecture and discussion by providing the proper terminology, spelling and meaning. This is especially true for classes such as calculus, chemistry, physics or other class for which an interpreter may have little or no knowledge and for which there is a limited sign language vocabulary. Speech recognition is not a replacement for an interpreter, rather a tool to help the interpreter convey difficult subject matter.

Foreign Language Speech Recognition

Speech recognition programs are available in several different languages such as, U.S. English, U.K.

INFORMATION YOU MIGHT USE

English, French, German, Italian, Swedish and Arabic. The many languages available for speech recognition can enable a deaf or hard-of-hearing person greater access to foreign language classes. Using a computer running a speech recognition foreign language program and a bilingual system operator, classroom conversations and exercises can be dictated into the computer, thus providing the student with the text necessary to participate. The information dictated into the computer can be saved on a disk and/or printed out. This provides the student with class notes and a hard copy of each lesson.

During the 1995 - 1996 academic year, the IDRT staff spent several months working with a deaf student named Adam in a mainstreamed Spanish language class. Adam was in his second year of Spanish and was having difficulties. Although he had done well in first-year Spanish, he was falling behind because of the quicker pace of second-year Spanish. His sign language interpreter was trying to interpret as much as possible but could only interpret when English was used. Because many of the daily activities were conducted in Spanish, Adam was missing much of the lesson and thus performing poorly. Joe Robison, IDRT Project Coordinator for speech recognition, was contacted by a representative from Adam's school asking if there was any technology that could help.

Mr. Robison, a fluent speaker of Spanish, went to Adam's school with a computer loaded with Spanish speech recognition software. Every day Mr. Robison would roll the computer into class on a small cart and dictate as much of the classroom conversation and exercises conducted in Spanish as possible. Adam would watch his sign language interpreter when English was spoken and the

computer screen when Spanish was spoken.

Results were favorable, especially considering that this was the first time IDRT and the school system had field tested the technology in a foreign language classroom. Adam felt it helped him follow class activities that were not written on the chalkboard or interpreted by his interpreter. He also believed that speech recognition could benefit other deaf or hard-of-hearing students in the future. Adam's interpreter also expressed gratitude for help in a situation where she was extremely limited. IDRT has attempted to introduce speech recognition to as many professionals in the field of deafness as possible by conducting work shops, giving lectures and providing training throughout the country so the deaf or hard-of-hearing community can become more informed about speech recognition.

Speech recognition technology is moving at an astonishing rate and researchers believe that continuous speech recognition capable of keeping up with normal conversation will be available for use within the next five years. There are many possibilities for this technology in the deaf or hard-of-hearing community and it will provide deaf or hard-of-hearing people with new communication options.